July 23, 1996

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Mr. M. L. Marchi
Manager - Nuclear Business Group
Wisconsin Public Service Corporation
Post Office Box 19002
Green Bay, WI 54307-9002

SUBJECT: AMENDMENT NO. 124 TO FACILITY OPERATING LICENSE NO. DPR-43 - KEWAUNEE NUCLEAR POWER PLANT (TAC NO. M95360)

Dear Mr. Marchi:

The Commission has issued the enclosed Amendment No. 124 to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant (KNPP). This amendment revises the Technical Specifications (TS) in response to your application dated May 8, 1996.

The amendment revises KNPP TS 5.3, "Reactor," and TS 5.4, "Fuel Storage," by removing the enrichment limit for reload fuel and imposing fuel storage restrictions on the spent fuel storage racks and the new fuel storage racks. The revised TS are structured consistent with the Westinghouse Standard Technical Specifications and the fuel storage restrictions are based on the criticality analyses used to support Amendment No. 92 dated March 7, 1991.

A copy of the Safety Evaluation is also enclosed. Notice of issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,

Original Signed By:

Richard J. Laufer, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-305

Enclosures: 1. Amendment No. 124 to License No. DPR-43
2. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 23, 1996

Mr. M. L. Marchi
Manager - Nuclear Business Group
Wisconsin Public Service Corporation
Post Office Box 19002
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cc w/encls: See next page

cc:

Foley & Lardner
Attention: Mr. Bradley D. Jackson
One South Pinckney Street
P. O. Box 1497
Madison, Wisconsin 53701-1497

Chairman
Town of Carlton
Route 1
Kewaunee, Wisconsin 54216

Mr. Harold Reckelberg, Chairman
Kewaunee County Board
Kewaunee County Courthouse
Kewaunee, Wisconsin 54216

Chairman
Wisconsin Public Service Commission
610 N. Whitney Way
Madison, Wisconsin 53705-2729

Attorney General
114 East, State Capitol
Madison, Wisconsin 53702

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
Route #1, Box 999
Kewaunee, Wisconsin 54216

Regional Administrator - Region III
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, Illinois 60532-4531

Mr. Robert S. Cullen
Chief Engineer
Wisconsin Public Service Commission
610 N. Whitney Way
Madison, Wisconsin 53705-2829

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

DOCKET NO. 50-305

KEWAUNEE NUCLEAR POWER PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 124
License No. DPR-43

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Wisconsin Public Service Corporation, Wisconsin Power and Light Company, and Madison Gas and Electric Company (the licensees) dated May 8, 1996, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-43 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 124, are hereby incorporated in the license. The licensees shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance, and is to be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard J. Laufer, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of issuance: July 23, 1996

ATTACHMENT TO LICENSE AMENDMENT NO. 124

FACILITY OPERATING LICENSE NO. DPR-43

DOCKET NO. 50-305

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

REMOVE	INSERT
TS iii	TS iii
TS 5.3-1	TS 5.3-1
TS 5.3-2	--------
TS 5.4-1	TS 5.4-1

5.3 REACTOR CORE

APPLICABILITY

Applies to the reactor core.

OBJECTIVE

To define those design features which are essential in providing for safe reactor core operations.

SPECIFICATION

a. Fuel Assemblies

The reactor shall contain 121 fuel assemblies. Each assembly shall consist of a matrix of zircaloy clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with NRC-approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

b. Control Rod Assemblies

The reactor core shall contain 29 control rod assemblies. The control material shall be silver indium cadmium.

5.4 FUEL STORAGE

APPLICABILITY

Applies to the capacity and storage arrays of new and spent fuel.

OBJECTIVE

To define those aspects of fuel storage relating to prevention of criticality in fuel storage areas.

SPECIFICATION

a. Criticality

1. The spent fuel storage racks are designed and shall be maintained with:

   a. Fuel assemblies having a maximum enrichment of 52.3 grams Uranium-235 per axial centimeter;

   b. $k_{eff} < 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties.

2. The new fuel storage racks are designed and shall be maintained with:

   a. Fuel assemblies having a maximum enrichment of 49.2 grams Uranium-235 per axial centimeter;

   b. $k_{eff} < 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties;

   c. $k_{eff} < 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties.

3. The spent fuel pool is filled with borated water at a concentration to match that used in the reactor refueling cavity and refueling canal during REFUELING OPERATIONS or whenever there is fuel in the pool.

b. Capacity

The spent fuel storage pool is designed with a storage capacity of 990 assemblies and shall be limited to no more than 982 fuel assemblies.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO AMENDMENT NO. 124 TO FACILITY OPERATING LICENSE NO. DPR-43

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

KEWAUNEE NUCLEAR POWER PLANT

DOCKET NO. 50-305

1.0 INTRODUCTION

By letter dated May 8, 1996, Wisconsin Public Service Corporation (WPSC), the licensee, requested a revision to the Kewaunee Nuclear Power Plant (KNPP) Technical Specifications (TS). The proposed amendment would revise KNPP TS 5.3, "Reactor," and TS 5.4, "Fuel Storage," by removing the enrichment limit for reload fuel and imposing fuel storage restrictions on the spent fuel storage racks and the new fuel storage racks. The revised TS are structured consistent with the Westinghouse Standard Technical Specifications and the fuel storage restrictions are based on the criticality analyses used to support Amendment No. 92 dated March 7, 1991.

2.0 BACKGROUND

In a letter dated March 7, 1991, the NRC issued Amendment No. 92 to Facility Operating License No. DPR-43 for KNPP. This amendment revised TS 5.3.a.3 to increase the allowable reload fuel enrichment at KNPP from 38.5 grams of uranium-235 (U^{235}) per axial centimeter (3.67 weight percent (w/o)) to 49.2 grams of U^{235} per axial centimeter (4.75 w/o). Amendment No. 92 did not affect TS 5.4, "Fuel Storage," since this TS does not currently specify fuel enrichment limits for the new and spent fuel storage racks.

Although Amendment No. 92 did not specify new limits on fuel enrichment for the new and spent fuel storage racks, these limits were addressed in the NRC safety evaluation which supported the amendment. The March 7, 1991, safety evaluation included a discussion of the criticality considerations for the new and spent fuel storage racks at KNPP. This discussion is repeated below.

> The KNPP spent fuel storage pool (SFP) consists of high density storage racks with 990 locations for fuel assemblies. The spent fuel storage racks are designed to store new (unirradiated) fuel and spent (irradiated) fuel in a vertical configuration under water. The fuel assemblies are maintained at a nominal center-to-center pitch of 10 inches and contain boron carbide plates as neutron absorbers. The new (unirradiated) fuel storage facility consists of storage racks with 44

locations for fuel assemblies. These racks store unirradiated fuel assemblies in a dry, vertical configuration with a minimum center-to-center spacing of 20.24 inches between fuel assemblies.

The criticality analyses for the storage racks used KENO-IV, a multigroup Monte Carlo theory computer code, for reactivity calculations. Neutron cross sections were based on data from the ENDF/B-II cross section library. The analytical methods and models were benchmarked against experimental configurations using various combinations of fuel assembly spacings and interspersed absorbing materials and were found to adequately reproduce the critical values. All benchmark cases used water as the moderating material and no critical configurations explicitly modeled the large new fuel storage rack spacing. However, the staff concludes that the method bias selected is conservative with respect to the large new fuel storage rack assembly spacing as well as the reduced density cases discussed below. Therefore, the analysis methods used for the new and spent fuel storage racks are found to be acceptable.

The prevention of criticality in fuel storage and handling is required by General Design Criterion 62 of Appendix A to 10 CFR Part 50. The design basis for preventing criticality in the spent fuel storage racks is that, including uncertainties, there is a 95 percent probability at a 95 percent confidence level (95/95 probability/confidence) that the effective multiplication factor (k_{eff}) of the fuel assembly array will be no greater than 0.95 when fully flooded with pure (unborated) water. The criticality criteria for the new fuel storage racks is that, including uncertainties, there is a 95/95 probability/confidence that k_{eff} will be no greater than 0.95 when fully flooded with pure water and no greater than 0.98 when filled with extreme, low-density water or other hydrogenous material such as may occur for fog, mist, and fire-fighting foam.

For the spent fuel storage racks, criticality analyses were performed to determine the maximum fuel enrichment which would still maintain k_{eff} less than or equal to 0.95. The following conditions were assumed in the analysis:

1. No structural braces or material were considered for the rack except the inner and outer stainless steel cans and B_4C poison plates.

2. No soluble poisons were considered

3. The pool water was assumed to be at the optimum (highest reactivity) temperature of 50°F.

4. All fuel contained an enrichment tolerance of +0.05 w/o U^{235}.

5. The fuel assemblies contained no burnable poisons.

6. Maximum thicknesses were used for the stainless steel inner and outer cans that surround the B_4C poison plates.

7. Minimum assembly pitches were calculated using cumulative tolerances.

8. No intermediate spacer grids were modeled.

In addition to assuming the most adverse (highest reactivity) initial conditions, biases and uncertainties in the calculational method were also included. All uncertainties correspond to a 95/95 one-sided tolerance level, as required by the NRC.

Abnormal occurrences such as off-center fuel placement, fuel assembly drop accidents, and fuel assemblies misplaced between the racks and fuel pool walls were also analyzed. The limiting spent fuel rack accident was found to be the fuel pool flooded with unborated water concurrent with a misplaced assembly. The maximum k_{eff} for this scenario, considering all appropriate uncertainties and biases and a maximum enrichment of 52.3 grams of U^{235} per axial centimeter (5.05 w/o), was calculated to be 0.93428 with a 95/95 tolerance level. This is within the NRC acceptance limit of 0.95 and is, therefore, acceptable.

For the new fuel storage racks, criticality analyses were performed to determine the maximum fuel enrichment which would still maintain k_{eff} no greater than 0.95 for flooded conditions and no greater than 0.98 for low-density conditions. The new fuel rack analyses assumed the same initial conditions as specified above for the spent fuel rack analyses. In addition, for the 100% dense water moderated cases the rack were assumed to be infinite in the x-y directions with a top 12-inch water reflector and a 24-inch thick concrete floor. For the low-density condition, a thickness of at least 13 feet of low density moderator was modeled above the active fuel and a concrete wall reflector in the x-y direction.

In addition to these adverse initial conditions, biases and uncertainties in the calculational method were included with all uncertainties corresponding to a 95/95 one-sided tolerance level, as required by the NRC.

Abnormal events such as off-center fuel placement and fuel assembly drops were considered as well as complete flooding of the dry new fuel storage racks by pure water and low-density water conditions. The maximum reactivity for fully flooded conditions was 0.91541 for an assumed enrichment of 5.05 w/o U^{235}, which is well within the NRC limit of 0.95. The limiting accident was found to be the new fuel storage area misted with 7% dense water concurrent with no assembly guides. This resulted in a k_{eff} of 0.97666 for an assumed enrichment of 49.2 grams per axial centimeter (4.75 w/o U^{235}). This is within the NRC limit of 0.98 for low-density water conditions and, therefore, acceptable.

3.0 EVALUATION

The licensee has proposed restructuring the format of TS 5.3, "Reactor," and 5.4, "Fuel Storage," to be consistent with the Westinghouse Standard Technical Specifications. The proposed changes include removing the enrichment limit for reload fuel and imposing fuel storage restrictions on the new and spent fuel storage racks. The restrictions are based on the criticality analyses used to support Amendment No. 92 as discussed above. The specification for the spent fuel storage racks (TS 5.4.a.1) will have a maximum fuel enrichment limit of 52.3 grams of U^{235} per axial centimeter, and the specification for the new fuel storage racks (TS 5.4.a.2) will have a maximum fuel enrichment limit of 49.2 grams of U^{235} per axial centimeter.

The licensee's proposed changes incorporate the results of analyses previously reviewed by the NRC in support of Amendment No. 92, dated March 7, 1991, and are structured to be consistent with the format of the Westinghouse Standard Technical Specifications. The staff, therefore, finds the proposed changes acceptable.

Other changes proposed by the licensee include (1) removing descriptions of the reload fuel and burnable poisons which are controlled through the appropriate reload analyses, and (2) removing description of the reactor coolant system and spent fuel storage structures which are contained in the Updated Safety Analysis Report (USAR).

The staff has reviewed these proposed changes and determined that removing these descriptions from the TS is acceptable because (1) their inclusion in technical specifications is not specifically required by 10 CFR 50.36 or other regulations, and (2) the descriptions have been relocated to the Core Reload Safety Evaluation, which is updated for each cycle, or to the Updated Final Safety Analysis Report (UFSAR), which is controlled by 10 CFR 50.59.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Wisconsin State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes a surveillance requirement. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding (61 FR 31185). Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

6.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: R. Laufer

Date: July 23, 1996